A REVIEW OF THE BERYCOID FISHES OF JAPAN.

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The present paper contains a review of the species of Berycidæ and related families, found in the waters of Japan. It is based on material collected by Jordan and Snyder in the summer of 1900, and on material in the United States National Museum, largely collected by the United States Fish Commission steamer *Albatross* in 1900.

The Berycoid fishes, as a whole, may be characterized by the presence of thoracic ventral fins, each with one spine and usually seven soft rays; head usually with conspicuous mucous cavities; air bladder in some species (*Beryx*, *Holocentrus*) retaining its duct through life, in others (*Trachichthys*, *Polymixia*) losing it with age; vertebræ in species examined 24 to 30; shoulder girdle and pharyngeals normal, the post-temporal not fused with the cranium; no suborbital stay. The Beryces, as thus characterized, form a natural group among the Percomorphi, allied to Percoidei and Scombroidei, but marked as a whole by the occasional retention of the archaic characters of the persistent air duct and the increased number of ventral rays, both characters derived from the Haplomi, their immediate ancestors and predecessors in the rocks as fossils. The group is a very old one in geologic time, older than any of the other Acanthopteri, the allies of *Beryx*, being among the earliest spiny-rayed fishes known. In the deep-sea forms the spinous dorsal is scarcely developed, and the scales are usually either cycloid or wanting. In the species of tropical shores the spinous armature of fins and scales is better developed than in most of the percomorphous fishes. All, except *Aphredoderus*, are marine fishes, inhabiting the tropical shores or the abysses of the ocean. The pertinence of Polymixiidæ to this group has been questioned, but according to Boulenger its skeleton is essentially Berycoid, although its curious barbels are almost exactly like those of *Mullus* and *Upeneus*.

We remove the Zeidæ from the Berycoids, although having similar ventrals, because no other distinct likeness appears, and the post-temporal is attached to the skull as in the Chætodonts. The Monocentridæ

Proceedings U. S. National Museum, Vol. XXVI—No. 1306.

are doubtless modified Berycoids, and we leave them in association, although recognizing no very close affinities. According to Boulenger, the Pempheridæ, with the Bathyclupeidæ, are near allies of the Berycoids, although having the ventral rays I, 5. Boulenger also places *Aphredoderus* among the Berycoid fishes with apparent justice. He further relegates *Stephanoberyx* and *Malacosarcus* to the Haplomi, an arrangement which may be open to question.

FAMILIES OF BERYCOIDEI.

a. Ventral rays I, 6 to I, 10, usually I, 7.
b. Chin without barbels; branchiostegals mostly 8.
c. Dorsal fin single, with 2 to 8 spines; anal spines 1 to 4.
d. Anal fin, with 4 spines its base, much long r than the dorsal base; suborbitals narrow; scales firm; ventral rays mostly I, 10.....Berycidæ, I.
dd. Anal fin relatively short, shorter than the dorsal; anal spines 1 or 2; ventral rays mostly I, 6, scales various; suborbitals usually broad, Trachichthyidæ, II.
cc. Dorsal fin deeply notched, with 10 to 13 strong spines; anal spines 4; scales firm, very rough.....Holocentridæ, III.
bb. Chin with 2 long barbels attached just behind symphysis of lower jaw; branchiostegals 4; dorsal fin continuous, with 5 spines; anal spines 3 or 4; scales moderate ctenoid; body deep, compressed; vertebræ 29, Polymixiidæ, IV.
aa. Ventral rays I, 3, the spine very large; dorsal spines isolated, the anterior very strong; body covered with a coat of mail formed of rough scales, Monocentridæ, V.

Family I. BERYCIDÆ.

Body oblong or ovate, compressed, covered with ctenoid, or cycloid, foliate, or granular scales. Head with large muciferous cavities, covered by thin skin. Eyes lateral, usually large. Nostrils, two on either side. Mouth wide, oblique. Premaxillaries protractile; maxillary rather large, usually with a supplemental bone. Suborbitals narrow, not sheathing the cheeks. Bands of villiform teeth on jaws, and usually on vomer and palatines; no canines; no suborbital stay. Opercular bones usually spinous. Branchiostegals 7 or 8. Gill-membranes separate, free from the isthmus. Gills 4, a slit behind the fourth. Pseudobranchiæ present; lower pharyngeals separate. Gill-rakers moderate. Cheeks and opercles scaly. No barbels. Dorsal fin continuous, with 2 to 8 weak spines; anal with 4 spines and many soft rays, much longer than the dorsal; ventral fins thoracic, mostly I, 7, the number of rays usually I, 10, always greater than I, 5; caudal fin usually forked. Pyloric cæca numerous. Vertebræ 24. Fishes mostly of the deep seas; the general color red or black. This group is an ancient type, a great number of extinct species being now known, from the Upper Cretaceous and later rocks. The following skeletal characters are added by Boulenger, these applying also to the Trachich-

thyidæ and Holocentridæ. One or more of suborbital bones, with an internal lamina supporting the globe of the eye. Anterior vertebræ without transverse processes; all or most of the ribs inserted on the transverse processes, where these are developed.

a. Scales ctenoid; teeth villiform on jaws, palatines, and vomer; vertebræ 24; muzzle short; chin projecting; preopercle spineless; opercles serrated; dorsal spines 4 to 7, graduated; anal rays IV, 26 to 30; ventrals I, 10.....*Beryx*, 1.

1. BERYX[a] Cuvier.

Beryx Cuvier, Regne Anim., 2d ed., II, 1829, p. 151 (*decadactylus*).

Body deep, compressed, covered with rather large, ctenoid scales, which are regularly arranged. Abdomen trenchant, but without enlarged scutes. Head large, with thin bones and high ridges with deep muciferous cavities. Snout short, the mouth oblique, the chin prominent; eye large; both jaws, vomer, and palatines with villiform teeth. Opercles serrated, the opercle usually with spine; preopercle unarmed. Caudal forked; anal spines 4, soft rays 26 to 30; dorsal continuous, with 4 to 6 spines; ventrals with about 10 soft rays. Air bladder simple. Pyloric cæca numerous. Deep-sea fishes, beautifully colored, chiefly scarlet.

(*βέρυξ*, *Beryx*, a Greek name of some fish, taken by Gesner from Varinus.)

a. Scales in lateral line 64 to 65; D. IV, 16 to 19 .....*decadactylus*, 1.
aa. Scales in lateral line 71 to 76; D. IV, 13 to 15 .....*splendens*, 2.

1. BERYX DECADACTYLUS Cuvier and Valenciennes.

Beryx decadactylus Cuvier and Valenciennes, Hist. Nat. Poiss., III, 1829, p. 222; Madeira or Portugal.—Poey, Synopsis, p. 297.—Goode and Bean, Oceanic Ichth., 1895, p. 175.—Steindachner and Döderlein, Fische Japans, I, 1883, p. 12; Tokyo.—Ishikawa, Prel. Cat., 1897, p. 58; Tokyo.—Jordan and Evermann, Fish N. and M. Amer., I, 1896, p. 844.—Steindachner, Ichth. Bericht., IV, p. 1, pl. 1; Canary Islands.

Head, 2½; depth, 2½; D. IV, 16 to 20; A. III or IV, 27 to 30; P. II, 14 to 15; V. I, 9 to 10. Lateral line 10 to 11, 70 to 73 (60 to 65) without caudal scales 21 to 22. Body oblong, considerably compressed, its height greatest at the origin of the dorsal; scales sharply ctenoid, with a strong middle keel. The maxillary reaches almost to the orbit, eye very large, its upper limb impinging upon the upper profile of the head, and 2½ in the length of the latter; operculum with an indistinct spine; the preorbital spine about one-third the eye; snout about

[a] According to Dr. Boulenger, the genus *Pempheris* should be placed with the Berycidæ. "*Beryx* and *Pempheris* agree so completely in structure, both external and internal, with the sole exception of the rays in the ventral fins (1, 5 in *Pempheris*) that I am inclined to doubt whether the difference between them should be regarded as greater than that between the former and *Trachichthys*."

two-fifths, and the inter orbital space somewhat more than half the eye. The base of the dorsal exceeds its height, the latter two-thirds the head; the insertion of the anal is approximately in the vertical from the teeth to the twelfth dorsal ray, and its middle is slightly behind the ultimate ray of the dorsal; the distance of the insertion of the pectoral to the snout is equal to the length of the base of the anal; the ventral is inserted under the axil of the pectoral, reaching the anal; caudal s rongly forked. Length, 37 cm. (about 14½ inches). (Description after Günther, Steindachner, Goode, Bean, Döderlein.)

Deep seas; recorded from Portugal, Madeira, Japan, and Cuba. No Japanese specimens seen by us.

(*δέκα*, ten; *δάκτυλος*, finger.)

2. BERYX SPLENDENS Lowe.

KIMMEDAI (GOLDEN-EYE PERCH).

Beryx splendens Lowe, Proc. Zool. Soc. Lond., 1833, p. 142; Madeira.—Goode and Bean, Oceanic Ichth., 1895, p. 176.—Steindachner and Döderlein, Fische Japans, I, 1883, p. 12; Tokyo.—Jordan and Evermann, Fish N. and M. Amer., I, 1896, p. 844.—Jordan and Snyder, Check List, 1901, p. 62; Yokohama.

Head, 3; depth, 2⅗; D. IV, 13; A. IV, 27 to 29; P. I, 16 to 17; V, 10 to 11. Scales 10–74–18, counted in the lateral line. Body elongate, compressed, and the deepest part forward; covered with moderate-sized scales, which are furnished with fine prickles, giving a somewhat rough touch. Head large, compressed, and many of the ridges or edges of the bones roughened or finely serrate; eye very large in front of the head above, 1⅓ in the maxillary and 2⅖ in the head; upper profile of the head slightly convex from the tip of the snout; snout very blunt; lower jaw produced; mouth very oblique, so that the tip of the snout is level with the middle of the eye; the nostrils close together on the snout in front of the eye; the posterior larger; the maxillary is expanded distally for a little more than half an eye diameter and does not reach to the margin of the eye behind; teeth of the jaws very fine and in bands; a short spine in front of the eye directed backward; symphysis with a slight knob below in front; snout a little less than half the eye and 1½ in the interorbital space; interorbital space flat; gill-opening very large, the membrane free from the isthmus; gill-rakers long and slender, 6–16, the longest equal to half the eye. Dorsal spines weak, graduated to the fourth, which is the longest, though falling short of the first ray, which is the highest of the dorsal fin; the origin of the anal falls below the base of the posterior dorsal ray, the spines graduated to the third, which is the longest; soft anal highest at the first ray, then sloping down till about half as high, so that the posterior part of the fin is of uniform height; pectorals very long, equal to the base of the soft anal and

reaching the base of the third soft ray; ventrals a little in advance of the dorsal but behind the pectorals and a little shorter than the latter in length; caudal forked, the lobes pointed; caudal peduncle compressed, two-thirds to three-fourths the length of the eye; lateral line high, inclined concurrent with the back, and running out on the base of the caudal; the rudimentary caudal rays, 3 or 4 sharp graduated spines above and below.

Color in alcohol uniform pale; in life bright scarlet, silvery white below. This description from two specimens, length 10¾ inches, obtained by Mr. Otaki from outside the entrance to Tokyo Bay, where it is said to be not rare. Other specimens were obtained by Jouy near Yokohama. Form a little more slender than Atlantic specimens but otherwise similar. The species is known from Madeira and from the Gulf stream.

(*splendens*, shining.)

Family II. TRACHICHTHYIDÆ.

This family is composed of deep-sea Berycoids differing from the Berycidæ in the short anal, shorter than the dorsal and usually with 1 or 2 species. The dorsal is single, the ventral rays usually I, 6; the scales various, usually rough and deciduous; the belly compressed, with a serrated edge; suborbitals usually broad; vertebræ, 26 to 28; color blackish; size, rather small.

a. Trachichthyinæ.—Scales large, normally formed; teeth small.

b. Vent normally placed, well behind the ventrals, the abdominal serræ before it.

c. Dorsal spines 7 or 8, strong, the median ones highest ..... *Gephyroberyx*, 2.

cc. Dorsal spines 6, slender, graduated. Vomer toothless; opercle entire; scales large ..... *Hoplostethus*, 3.

bb. Vent inserted well forward close behind the ventrals; the abdominal serræ behind it; vomer toothless ..... *Paratrachichthys*, 4.

2. GEPHYROBERYX Boulenger.

Gephyroberyx Boulenger, Ann. Mag. Nat. Hist., March, 1902, p. 203 (*darwini*).

Body rather short, covered with large rough, irregular scales; ventral ridge serrated; snout short, rounded; mouth oblique; eye large; very fine teeth on jaws, vomer, and palatines. Vent far behind ventrals. Branchiostegals 8; a strong spine on the shoulder girdle; one on angle of preopercle; a small one on the opercle; suborbital with radiating ridges; dorsal single, with 7 or 8 spines, strong and wide apart, the middle ones highest; ventral rays I, 6; caudal forked. Fishes inhabiting considerable depths, known from Madeira, India, and Japan. The genus is allied to *Trachichthys*, differing in the stronger and more numerous dorsal spines.

(γεφύρος, bridge: Beryx.)

3. GEPHYROBERYX JAPONICUS (Döderlein).

Trachichthys japonicus DÖDERLEIN, Fische Japans, I, 1883, p. 10; Tokyo.

Head $2\frac{1}{2}$; depth $2\frac{1}{5}$. D. VII, 15; A. III, 12; P. I, 14; V. I, 6; pores in the lateral line 30; abdominal serræ 14.

Body deep and compressed, and covered with small, rough ctenoid scales; the scales containing the pores of the lateral line a trifle enlarged, and the scales on the front of the back very small. Head very deep and compressed, the ridges of the bones somewhat elevated and forming mucous cavities, over which are thin covering membranes; upper profile slightly convex, or nearly straight with the snout very obtusely rounded; eye small, its posterior margin a little nearer the gill-opening than the tip of the snout $3\frac{1}{3}$ in the head, a little over 2 in the maxillary, and equal to the interorbital space; mouth very oblique, the maxillary extending to below the posterior part of the eye; nostrils large, the posterior the larger, directly in front of the anterior margin of the eye above, and the anterior about half an eye diameter distant; jaws rough, and with a single series of small firm teeth along the edges; the lower jaw projects and the symphysis is somewhat knobbed, so that it protrudes a little in front; vomerine teeth small; at the origin of the lateral line at the back part of the head above a sharp spine, another on the posterior margin of the opercle above, still another in front of the base of the pectoral, and one at the lower part of the preopercnlum, the latter strong, long, and sharp; two small, short spines at the front of the snout; operculum strongly striate; interorbital space convex; gill-opening large; gill-rakers long, slender, pointed, seven-sixteenths; branchiostegals 8; gill-membrane free over the isthmus. The dorsal fin begins a short distance behind the gill-opening, the spinous part highest in the middle, then descending to the soft dorsal, which is also higher in front; first anal spines short, the third the longest; soft anal high in front, sloping behind; pectoral long, $1\frac{2}{5}$ in the head; ventrals short, not reaching the origin of the anal by half their length; caudal deeply emarginate, the lobes pointed; rudimentary caudal rays developed as 6 spines above and below. Lateral line inclined from the upper part of the head to the base of the caudal; caudal peduncle three-fourths of the eye; vent far behind ventrals, space from between the ventrals to the anus with a single series of bony scutes or serræ.

Color in alcohol, brown, the fins pale, the inside of the mouth blackish, and the peritoneum black. Length $4\frac{5}{16}$ inches. Here described from an example dredged by the United States Fish Commission steamer *Albatross* in Suruga Bay at Station 3716. The species is otherwise known only from the description given by Dr. Döderlein of specimens from Tokyo, probably taken in Sagami Bay. Dr. Boulen-

ger speaks of the occurrence of *Gephyroberyx darwini* Lowe (from Madeira) in Japan. He has doubtless reference to *Gephyroberyx japonicus* a species which needs comparison with *G. darwini*, from which it differs, perhaps, in the presence of 7 instead of 8 dorsal spines.

3. HOPLOSTETHUS Cuvier and Valenciennes.

Hoplostethus Cuvier and Valenciennes, Hist. Nat. Poiss., IV, 1829, p. 469 (*mediterraneus*).

Body short and deep, much compressed. Head short, compressed, very blunt anteriorly, deeper than long, with very conspicuous mucous cavities. Eye very large. Mouth very oblique, the jaws equal when the mouth is closed. Maxillary long, broad behind, with a distinct supplemental bone, which reaches the posterior border of the eye. Teeth very fine, villiform, on jaws and palatines, none on the vomer. Suborbital with radiating ridges and a few spines; a vertical ridge on the front of the opercle. Opercle little developed, its spine small or obsolete; a strong spine at the angle of the preopercle; the long vertical limb of the preopercle finely serrated. Gill-membranes separate, free from the isthmus. Branchiostegals 8. Scales moderate or small, ctenoid; lateral line present, its scales enlarged; abdomen with a series of bony plates, each ending in a retrose spine. Dorsal fin continuous, short, the spines graduated, 6 in number; anal with 3 graduated spines; caudal forked, its rudimentary rays spinous; pectorals low, rather long; ventrals I, 6, rather short. Air bladder simple. Pyloric cæca numerous. Vertebræ 11 + 15. Deep-sea fishes, red in color.

Boulenger, following Lowe, unites *Hoplostethus* with *Trachichthys*. The difference is certainly slight, *Hoplostethus* lacking vomerine teeth and having 6 dorsal spines instead of 3.

(ὅπλον, armor; στῆθος, breast.)

4. HOPLOSTETHUS MEDITERRANEUS Cuvier and Valenciennes.

HINCHIDAI (FLINT-PERCH).

Hoplostethus mediterraneus Cuvier and Valenciennes, Hist. Nat. Poiss., IV, 1829, p. 469; Mediterranean Sea.—Günther, Cat., I, 1859, p. 9.—Jordan and Gilbert, Synopsis, 1883, p. 458.—Goode and Bean, Oceanic Ichthyology, 1895, p. 181.—Ishikawa, Prel. Cat., 1897, p. 58; Kii.

Trachichthys pretiosus Lowe, Proc. Zool. Soc. Lond., 1839, p. 77; Madeira.

Hoplostethus japonicus Hilgendorf, Sitz. Ges. Naturforschende Freunde, Berlin, 1879, p. 78; Japan.

Hoplostethus mediterraneus (var. ?) Steindachner, Fische Japans, I, 1883, p. 10, pl. 1; Tokyo.

Head, $2\frac{3}{5}$ to $2\frac{2}{3}$; depth, 2 to $2\frac{1}{5}$; D., VI, 13 to 14; A., III, 9 to 10; P., I, 14 to 16; V., I, 6; ventral scutes, 9 to 15; scales, 28 to 29. Body ovate, deep, compressed, and covered with small ctenoid scales, except those of the lateral line, which are enlarged; above and on the

back in front the scales are exceedingly small. Head very large and deep, the ridges of the bones elevated and forming large mucous cavities between covered with thin transparent membranes; upper profile roundly convex from the snout; eye very large, in the upper half of the head, its posterior margin nearer the gill-opening than the tip of the snout, 3 in the head, 2 in the maxillary, and a little more than the width of the interorbital space; mouth oblique, the maxillary extending till a short distance from the posterior margin of the eye; nostrils large and directly in front of the upper part of the eye, like most of the exposed ridges of the head roughened; the lower jaw projecting and with a small protruding process at the symphysis; above the opercnlum, at the origin of the lateral line a strong spine, and another at the end of the preopercnlum below, the latter very broad; 3 bony ridges cross over from the eye to the preopercnlum; teeth small, fine, and in broad bands in the jaws, forming a series slightly enlarged inside; no vomerine teeth; interorbital space high and convexly rounded; opercles with many striæ; gill-openings very large; gill-rakers 6+16, very long and slender, much larger than the gill-filaments; branchiostegals 8; gill-membrane free from the isthmus; dorsal a short distance behind the gill-opening; the spinous fin graduated to the last spine, which is as long as the eye, but not as high as the anterior soft dorsal rays, which are the highest part of that fin, and rounded; anal spines with the first 2 very short, and the third very long, though not equal to the longest anal rays; pectoral very long, shorter than the head, and reaching the origin of the soft anal; ventrals short, about $1\frac{3}{4}$ in the head, and not reaching the anus; caudal deeply emarginate and with the lobes somewhat pointed; rudimentary caudal rays developed as 6 graduated spines above and below. The lateral line a series of large pores obliquely from the upper part of the head to the base of the caudal. Space from between the ventrals to the anus armed with a single series of backwardly directed serræ. Caudal peduncle compressed and about equal to the eye.

Color in alcohol brown, the fins pale, the inside of the mouth and the peritoneum black. Total length, $9\frac{3}{8}$ inches. Here described from specimens dredged in Sagami Bay by the U. S. Fish Commission steamer *Albatross*.

In young examples the ventrals reach the anus, the pectorals are longer, the preopercular spine is longer, and in the smallest examples, from Kishyu, the sides are scaly like the rest of the body. All the specimens have the single bony bridge across the preopercnlum from one margin to the other at about one-fourth its height.

Coasts of Japan in deep water; our specimens dredged in deep water by the U. S. Fish Commission steamer *Albatross* in Sagami Bay, at stations 2339 and 2348 and at stations 3721 and 3738 in Suruga Bay. We also have a small specimen from Kishyu (Kii).

We are wholly unable to find any difference between our specimens and the accounts given of the Mediterranean species, which is also well diffused in the deep waters of the Atlantic.

4. PARATRACHICHTHYS Waite.

Paratrachichthys WAITE, Scient. Results, H. M. C. S. Thetis, 1899, p. 64 (*traillii*).

This genus is allied to *Gephyroberyx*, differing in the anterior insertion of the vent, which is close behind the ventral fins; a series of bony serræ behind the vent. Scales small, rough—ctenoid; no vomerine teeth; dorsal spines 6, graduated. Japan to Australia, in deep water. (παρά, near: *Trachichthys*.)

5. PARATRACHICHTHYS PROSTHEMIUS Jordan and Fowler, new species.

Head, $2\frac{5}{6}$; depth, $2\frac{2}{3}$; D. VI, 14; A. III, 9; P. I, 11; V. I, 6; ventral scutes, 9; scales, 54. Body elongate, compressed, and covered

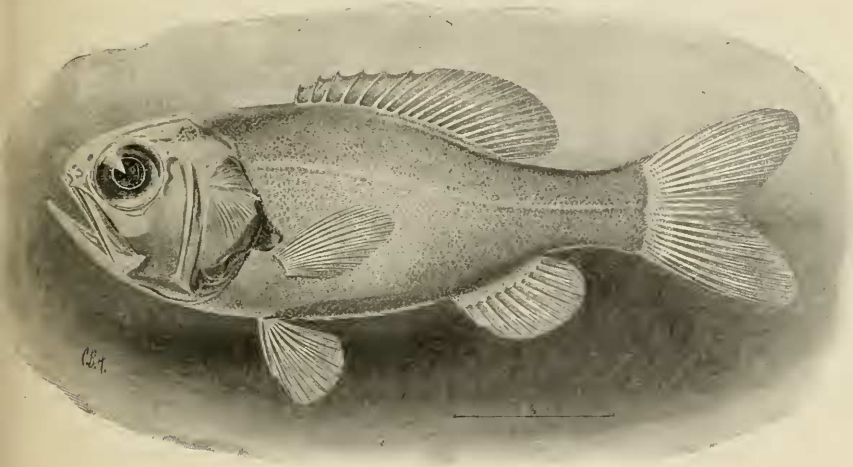

FIG. 1.—PARATRACHICHTHYS PROSTHEMIUS.

with small, rough, ctenoid scales, those of the lateral line not especially enlarged; above, on the front part of the back, the scales are very small. Head large, deep, and compressed, the ridges of the bones somewhat elevated and forming mucous cavities between which are thin covering membranes; upper profile roundly convex, the snout very obtuse, eye large, its posterior margin nearer the tip of the snout than the posterior margin of the gill-opening, $2\frac{2}{3}$ in the head; $1\frac{1}{2}$ in the maxillary, and greater than the interorbital space; mouth very oblique, the maxillary extending nearly to the posterior margin of the eye; nostrils large and directly in front of the eye; above, teeth of the jaws very fine and in broad bands; no vomerine teeth; lower jaw projecting; most of the protruding ridges of the head roughened; above the operculum, at the origin of the lateral line a sharp spine directed back-

ward, another on the posterior margin of the opercle above, and still another at the end of the preopercular below; there are no distinct bony ridges connecting the eye with the anterior edge of the preopercular, and the latter is parallel with its posterior edge but not crossed by a bony bridge; interorbital space flatly convex; opercles with many striæ; gill-opening very large; gill-rakers 6–15, very long and slender, much longer than the longest gill-filaments; branchiostegals, 8; gill-membrane free from the isthmus. Dorsal a short distance behind the gill-opening, graduated to the last spine, which is the longest and nearly equal to the eye; soft dorsal high in front and then sloping behind; anal graduated to the third and longest spine, which is not equal to the higher soft rays; pectoral small, $1\frac{2}{3}$ in the head, and reaching beyond the ventrals; ventrals short, about $1\frac{2}{3}$ in the space between their own origin and the origin of the anal; caudal emarginate and the lobes pointed; rudimentary caudal rays developed as 6 graduated spines above and below. The lateral line obliquely running from the upper part of the head to the base of the caudal. Caudal peduncle compressed, $2\frac{2}{3}$ in the head. Space from between the ventrals nearly to the origin of the anal provided with a single series of backwardly directed serræ. Vent in front of the abdominal serræ and between the ventrals.

Color in alcohol brown, the fins all pale, blackish between the mandibles and over the branchiostegal membranes; peritoneum black and some parts of the mouth blackish inside. Length, $2\frac{7}{16}$ inches. Here described from a specimen dredged at station 3730 by the U. S. Fish Commission steamer *Albatross* in Suruga Bay.

It is numbered 50575, U.S.N.M.

(*προσεμιός*, forward, in allusion to the location of the vent.)

FAMILY III. HOLOCENTRIDÆ.

SOLDIER-FISHES.

Body oblong or ovate, moderately compressed, covered with very strongly ctenoid or spinous scales. Head with large muciferous cavities, eye lateral, very large; preorbital very narrow; mouth moderate, oblique; premaxillaries protractile; maxillary very large, with supplemental bone; bands of villiform teeth on jaws, vomer, and palatines. Opercular bones and membrane bones of head generally serrated or spinescent along their edges. Branchiostegals 8. Gill-membranes separate, free from isthmus. Gills 4, a slit behind fourth. Pseudobranchiæ present. Gill-rakers moderate; no barbels. Sides of head scaly. Lateral line present. Dorsal fin very long, deeply divided, with about 11 strong spines depressible in a scaly groove; anal with 4 spines, the third longest and strongest; ventrals thoracic, with 1 spine and 7 rays; caudal deeply forked, with sharp rudimentary rays or

fulcra at base. Vertebræ about 27. Pyloric cœca 8 to 25. Air bladder large, sometimes connected with the organ of hearing. General color red. Young with the snout sharp and produced (constituting the nominal genera *Rhynchichthys*, *Rhamphoberyx*, and *Rhinoberyx*, based on peculiarities of immature examples). Skeletal characters essentially in *Beryx*, the fin spines much stronger. Gaily colored inhabitants of the tropical seas, abounding about coral reefs.

a. Preopercle without conspicuous spine at its angle; scales very large (about 28) and very rough ..... *Ostichthys*, 5.

aa. Preopercle with a conspicuous spine; suborbital arch simply serrated; scales moderate, 38 to 55; mouth moderate ..... *Holocentrus*, 6.

5. OSTICHTHYS Jordan and Evermann.

Ostichthys (Langsdorff Ms.) Cuvier and Valenciennes, Hist. Nat. Poiss., III, 1829, p. 174 (*japonicus;* name only, passing reference).

Ostichthys Jordan and Evermann, Fishes N. and M. Am., I, 1896, p. 846 (*japonicus*).

This genus is closely related to *Holocentrus*, differing externally, in the absence of the large spine at the angle of the preopercle and especially in the very rough surface of the large scales. In this regard it differs from *Myripristis*, which, while lacking also the preopercular spine, has the scales of *Holocentrus*. *Holotrachys* (*lima*), another genus with similarly rough scales, differs from *Ostichthys* in having the scales very much smaller, about 45 in the lateral line instead of 28, as in *Ostichthys*.

(ὀστέον, bone; ἰχθύς, fish.)

6. OSTICHTHYS JAPONICUS (Cuvier and Valenciennes).

KINDAI (GOLDEN PERCH); NISHIKIDAI (BROCADE PERCH); UMIKINUWO (SEA GOLD-FISH).

Myripristis japonicus Cuvier and Valenciennes, Hist. Nat. Poiss., III, 1829, p. 173, pl. LVIII; Japan Coll. Langsdorff.—Schlegel, Fauna Japonica, Poiss., 1847, p. 23, pl. IX a; Nagasaki.—Günther, Cat. Fish., I, 1859, p. 25; Japan, China, Île de France.—Steindachner, Fische Japans, I, 1883, p. 14; Tokyo.

Ostichthys japonicus Jordan and Evermann, Proc. U. S. Nat. Mus., XXV, 1902, p. 334; Formosa.

Head, $2\frac{3}{5}$; depth, $2\frac{1}{4}$; D. XII, 13; A. IV, 11; P. I, 16; V. I, 7. Scales, $\frac{4}{1}$–28–7. Body deep and compressed, covered with large scales which are provided with parallel striæ forming a prickly edge behind, and some of the middle ones sharp and strong. Head, large, the ridges of the bones large and striate; upper profile convex; eye, large, above and in front, $3\frac{1}{5}$ in the head, about $1\frac{1}{3}$ in the maxillary, and $2\frac{1}{2}$ in the height of the preoperculum; the mouth is very large, inclined, the maxillary expanded distally, so as to fall very little short of an eye diameter, and reaching posteriorly beyond the eye; jaws large and powerful, the upper scooped out in front so that the symphysis of the mandible

fits in; the lower jaw projects; teeth in small rough patches or bands in the jaws; nostrils close together, directly in front of the eye, and the posterior very large, 4 in the eye; lips thick, fleshy, and papillose; interorbital space $1\frac{2}{3}$ in the eye; very slightly elevated; opercle above with a strong, backwardly produced spine; 9 scales along the posterior edge of the preoperculum on the operculum cheeks scaled; gill-opening, very large, the membrane free from the isthmus; gill-rakers, 6, 11, very long, slender, pointed, and $1\frac{1}{2}$ in the eye. Dorsal inserted before the posterior edge of the gill-opening, third and fourth species longest and strongest, about $2\frac{1}{2}$ in the depth of the body; soft dorsal highest in front, nearly equal to the highest dorsal spines; the third anal spine the longest to the eye, the soft part of the spine nearly as

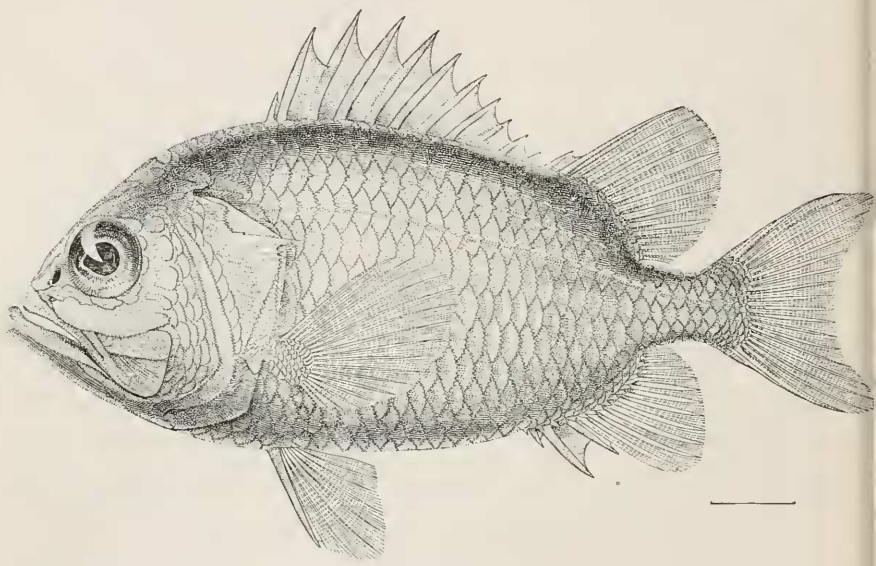

FIG. 2.—OSTICHTHYS JAPONICUS.

high as the soft dorsal; pectorals low, a little in front of the dorsal, not reaching the vent, and $1\frac{1}{2}$ in the head; ventrals below pectorals shorter, and the spines a trifle shorter than the fourth dorsal spine. Lateral line inclined to the base of the caudal from the upper part of the head. Caudal peduncle rather thick, compressed, and $1\frac{2}{3}$ in the ventral spine.

Color, in alcohol, pale; in life, bright crimson. Length, $13\frac{1}{4}$ inches. Here described from a specimen from Giran, Formosa.

Of this fine large fish we have examined a living specimen in the Asakusa Aquarium from Misaki, and another from Giran, Formosa. It is occasionally taken off the rocky headlands of Southern Japan, but it is nowhere common. Our figure is taken from the Giran specimen.

6. HOLOCENTRUS (Artedi) Scopoli.

Holocentrum Artedi, Seba, III, about 1738, nonbinomial (*rubrum*).
Holocentrus Gronow, Zoophyl, 1763, p. 65 (*rostratus*, nonbinomial).
Holocenthrus (Gronow) Scopoli, Int. Hist. Nat., 1777, p. 449 (misprint).
Holocentrus Bloch, Ichthyol., IV, 1790, p. 61 (*sogo*).
Rhynchichthys Cuvier and Valenciennes, Hist. Nat. Poiss., VII, 1831, p. 503 (*pelamidis;* young).
Rhinoberyx Gill, Proc. Acad. Nat. Sci. Phila., 1862, p. 237 (*brachyrhynchus;* young; scales said to be 25; may represent a distinct genus).
Holocentrum of authors generally.

Body oblong, moderately compressed, the ventral outline nearly straight, the back a little elevated, the tail very slender. Head compressed, narrowed forward. Operculum with a strong spine above, below which the edge is sharply serrated; a strong spine at the angle of preopercle. Orbital ring, preorbital, preopercle, interopercle, subopercle, occiput, and shoulder girdle with their edges sharply serrate. Mouth small, terminal, the maxillary not extending to the middle of eye; the lower jaw projecting in the adult; in the young (which constitute the supposed genera *Rhynchichthys* and *Rhinoberyx*) the snout is much produced. Maxillary broad, striate, with a supplemental bone. Eye excessively large. Scales moderate, closely imbricated, the posterior margin strongly spinous. Lateral line continuous. Dorsal deeply emarginate, the spines usually 11, depressible in a groove; soft dorsal short and high; anal with 4 spines, the first and second quite small, the third very long and strong, the fourth smaller; caudal widely forked; both lobes with the rudimentary rays spine-like; ventrals large, I, 7, the spine very strong. Species numerous, remarkable for the development of sharp spines almost everywhere on the surface of the body.

(ὅλος, whole; κέντρον, spine; spinous all over.)

a. Scales 36 to 37.
b. Color red, striped with white; spinous dorsal plain ..... *spinosissimus*, 7.
bb. Color red, striped with black; spinous dorsal with black blotches .. *alboruber*, 8.
aa. Scales 48; color red, striped with darker; base of pectoral and tips of caudal black ..... *ittodai*, 9.

7. HOLOCENTRUS SPINOSISSIMUS Schlegel.

ITTODAI (NUMBER ONE PERCH).

Holocentrus spinosissimus Schlegel, Fauna Japonica, 1847, p. 22, pl. VIII, A; Nagasaki.—Günther, Cat. Fish., I, 1859, p. 41 (copied).

Head, $2\frac{2}{3}$; depth, $2\frac{2}{3}$; D., XI, 13; A., IV, 9; P., I, 13; V., I, 7. Scales 3–37 or 38–6. Body rather long, compressed, and covered with large, striated scales, rather rough to the touch. Head compressed, and the upper profile somewhat convex; eye large, its posterior margin nearer the gill-opening than the tip of the snout, $2\frac{3}{4}$ in the head and equal

to the maxillary; snout bluntly pointed, 2 in the eye; nostrils directly in front of the eye, and the posterior very large; mouth inclined, the maxillary expanded distally till it is $2\frac{3}{5}$ in the eye, and reaching below the first two-thirds of the eye; teeth in fine, roughened bands in the jaws; the lips rather thick and fleshy; the lower jaw projects but little; interorbital space concave above and equal to about three-fifths the eye; bones on the head rough, striated, and with the edges serrated; two opercular spines; preoperculum with its lower angle with a strong backward spine; five rows of scales on the cheeks; preorbital spine strong; gill-opening large; gill-rakers 7+10, rather short and most of them poorly developed. Dorsal before the edge of the gill-opening and the pectoral, the third and fourth spines the highest; soft dorsal highest in front and nearly as high as the spinous dorsal; third anal

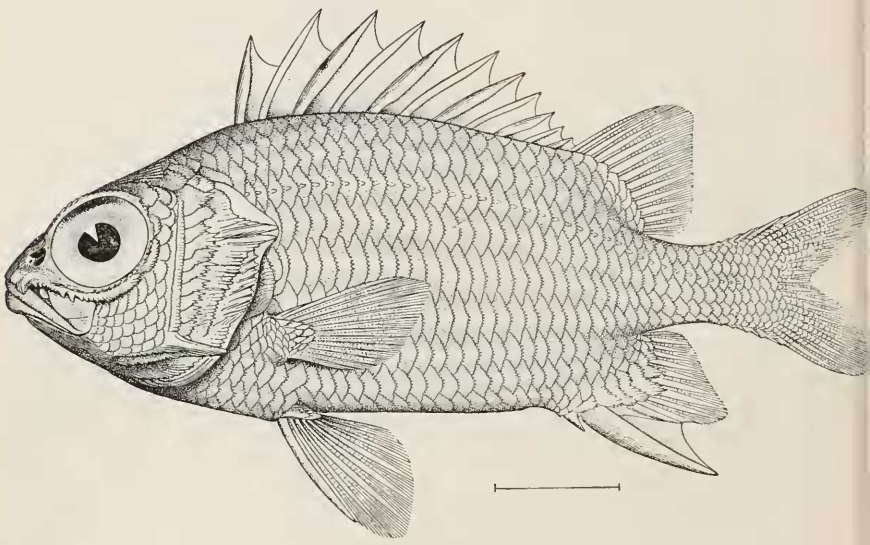

FIG. 3.—HOLOCENTRUS SPINOSISSIMUS.

spine very strong and long, though not as long as the longest rays, which are in front; pectoral a trifle shorter than the ventral, and about equal to the third anal spine; ventrals a little behind pectorals and with their tips reaching for nearly two-thirds the space between their bases and the origin of the anal; caudal emarginate, the lobes distinct; rudimentary caudal rays several and developed as graduated spines above and below; lateral lines inclosed from the head to the base of the caudal; caudal peduncle compressed, about two-thirds the eye.

Color plain brown in alcohol, with traces of 9 longitudinal silvery bands, and the cheeks and opercles silvery. Length 7 inches. Here described from two examples from Wakanoura.

Color in life brilliant scarlet, with white stripes, one stripe extending obliquely below the eye.

This beautifully colored fish is occasionally taken on rocky shores in the Kuro Shiwo, of southern Japan. Our specimens are from Wakanoura, where it is common in the open water.

(*spinosissimus*, most spiny.)

8. HOLOCENTRUS ALBORUBER Lacépède.

? Sciæna rubra Forskål, Descr. Anim., 1775, p. 48; Red Sea.

? Perca rubra Schneider, Syst. Ichth., 1801, p. 90 (after Forskål).

? Holocentrus ruber Rüppell, Atl., 1828, p. 83, pl. xxii, fig. 1; Red Sea.

Holocentrum rubrum Günther, Cat. Fish., I, 1859, p. 35 (in part?); Amboina, Japan, Louisiades, Philippines, China, India, Red Sea.—Bleeker, Atl. Ichth. IX, pl. iii, fig. 4.

(*Holocentrum rubrum* Day, Fishes India, pl. xli, fig. 4, is apparently some other fish.)

Holocentrum rubrum Ishikawa, Prel. Cat., 1897, p. 58; Miyakoshima.

Holocentrum alborubrum Lacépède, Hist. Poiss., IV, 1803, p. 372; China Seas, from a Japanese print.—Richardson, Ichth. China, 1846, p. 223; Canton.

? Perca praslin Lacépède, Hist. Poiss., IV, 1803, p. 418; New Britain.

? Holocentrum orientale Cuvier and Valenciennes, Hist. Poiss., III, 1829, p. 197; VII, p. 497; Red Sea, Pondicherry.

? Holocentrum marginatum Cuvier and Valenciennes, Hist. Poiss., III, 1829, p. 216; India.

Head, $2\frac{4}{5}$; depth, $2\frac{2}{3}$; D., XI, 13; A., IV, 10; P., I, 13; V., I, 7. Lateral line 3–36–7. Body elongate, compressed, and covered with rather large ctenoid scales. Head moderate, the upper profile strongly convex over the eyes; eye large, $2\frac{2}{3}$ in the head and impinging upon the upper profile; snout pointed, a little over half the eye; mouth terminal, inclined, the lower jaw slightly projects, and the maxillary does not reach the middle of the eye; teeth minute and in bands in the jaws; nostrils directly in front of the eye and the posterior very much the larger; cheeks with 4 rows of scales; interorbital space slightly concave; opercles with two strong spines; the preoperculum with a single strong spine below, and the preorbital spine short; head more or less striate, and with the edges of the bones more or less denticulate; gill-opening large; gill-rakers 6–10, slender, pointed, rather poorly developed. Dorsal about over the pectorals, the spinous fin rather high, highest in the middle and in front; soft dorsal about over the spinous anal, the anterior rays the highest, but not as high as the anterior rays of the soft anal, which are also the highest of that fin; third anal spine strong, long, and at least equal to the highest anal ray; pectorals shorter than the ventrals, about $1\frac{2}{5}$ in the head; ventrals behind the pectorals; the spine a little more than two-thirds the length of the fin, and its tip not reaching the vent; caudal forked, the lobes produced; rudimentary caudal rays as 4 graduated spines above and below. Lateral line nearly concurrent with the back to the base of the caudal; caudal peduncle compressed, about $1\frac{1}{4}$ in the eye.

Color in alcohol brown, dark and deep above, the sides with about

9 longitudinal broad bands following the course of the scales; dorsal light, with the membrane between the first 3 spines, with a broad blackish band above, which is continued on the membrane of the rest of the fin as a broad black blotch in front of each spine; membrane, including the fourth anal spine to the first soft ray, black; edge of the caudal above and below brownish; the head above is more or less uniform brownish; the lower surface of the body has a silvery appearance; membrane between the ventral spine and the first ray white.

In life the species was deep red with white longitudinal stripes.

Length about $5\frac{3}{4}$ inches. Here described from an example from Okinawa, Riukiu.

Of this strongly marked species we have one specimen from Nafa, in Okinawa. It agrees fairly with Günther's description of *Holocentrus ruber*, or rather with the Japanese, Louisiade and Amboina specimens, having the anal spine 5 in total length, not $4\frac{1}{3}$, as in the Red Sea example, presumably typical of *H. ruber*. In Bleeker's figure the preopercular spine is represented as much longer than in our examples. Day's description and figure differ so much that we suppose them to belong to another species. In view of the uncertainty as to the identity of the Japanese form with *Holocentrus ruber* of the Red Sea, we retain provisionally the name *Holocentrus alboruber*, which seems to admit of no doubt. The species may however prove fully identical with *Holocentrus ruber*.

(*albus*, white; *ruber*, red.)

9. HOLOCENTRUS ITTODAI Jordan and Fowler, new species.

Head $3\frac{1}{6}$; depth $2\frac{3}{8}$; D., XI, 14; A., IV, 11; P., I, 13; V., I, 7. Lateral line 3–48–7. Body elongate, compressed, and covered with small, ctenoid scales. Head rather small, the upper profile strongly convex over the eyes; eye very large, $2\frac{1}{2}$ in the head, and impinging upon the upper profile; snout pointed, about 2 in the eye; mouth small, inferior and inclined, the maxillary not reaching to the middle of the eye; teeth minute and in bands on the jaws; nostrils directly in front of the eye and the posterior very much the larger; interorbital space slightly concave, cheeks with 5 rows of scales; opercles with 2 strong spines; the preoperculum with a single strong spine below, and the preorbital spine short; head more or less striate and with the edges of the bones finally denticulate. Gill-opening large, the gill-rakers 5+11, slender, pointed, rather poorly developed. Dorsal about over the pectoral, the spinous fin rather high, highest in the middle; soft dorsal beginning over the origin of the spinous anal, the anterior rays the highest, but not as high as the anterior rays of the soft anal, which are also the highest of that fin; third anal spine strong, long, and equal to the highest soft ray; pectorals shorter than the ventrals, about $1\frac{1}{2}$ in the head and about equal to the third anal spine; caudal

forked, the lobes produced; rudimentary caudal rays as 4 graduated spines above and below. Lateral line inclined to the base of the caudal; caudal peduncle compressed, about $1\frac{1}{2}$ in the eye.

Color red in life, in alcohol brown, the sides with 11 white longitudinal bands following the course of the scales; spinous dorsal with a narrow white longitudinal band running not far from the base of the fin, above which in front is a broad blackish band, distinct between the first 3 spines only.

Total length $4\frac{5}{16}$ inches. Here described from a specimen from Okinawa, Riukiu.

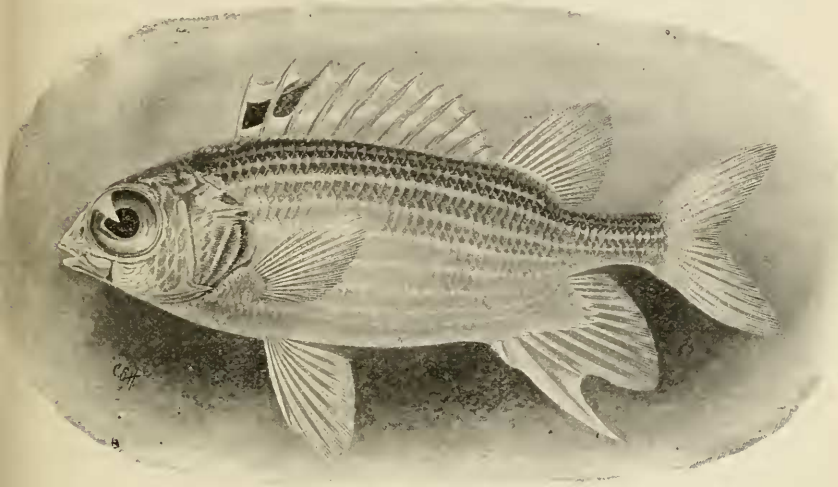

FIG. 4.—HOLOCENTRUS ITTODAI.

Of this species we have a single example from Nafa, in Okinawa. It is apparently nearest to *Holocentrus diadema*, but it is markedly different in color.

(*ittodai*, number one Tai or Porgy; *Itto*, meaning number one among many, (probably for its beauty.)

Family IV. POLYMIXIIDÆ.

BARBUDOS.

Body rather elongated and compressed; scales not serrated; lateral line continuous with back; head compressed, and with a decurved profile; preoperculum serrated; mouth with a lateral and nearly horizontal cleft; teeth villiform, on both jaws and on palate; branchiostegal apertures large, the gill-membranes separate, free from the isthmus; branchiostegals 4; dorsal moderately elongated, with several spines, increasing backward; anal opposite the posterior portion of dorsal, armed with 3 or 4 spines; pectorals with branched rays; ventral fins thoracic, each with a spine and 6 or 7 rays. Vertebræ in increased

number (29). The family is distinguished by the combination of chin barbels, increased number of rays, and small number of branchiostegals. The increased number of ventral rays and the structure of the fins points plainly to Berycoid affinities. According to Boulenger, the skeleton is essentially that of *Beryx*, and the species resemble Mullidæ in the peculiar hyoid barbels, but in no other regard.

A single genus, with a few species, inhabiting rather deep waters in the tropical Atlantic and Pacific.

7. POLYMIXIA Lowe.

Polymixia Lowe, Trans. Cambr. Phil. Soc., 1838, p. 198 (*nobilis*).
Nemobrama Valenciennes, Berber-Webb and Berthelot, Ichth. Iles. Canar., 1844, p. 40 (*webbii*).
Dinemus Poey, Memorias II, 1860, p. 160 (*venustus*).

Characters of the genus included above.

(πολύς, many; μτξις, mixing; a mixture of the characters of many groups.)

10. POLYMIXIA JAPONICA Steindachner.

GINME (SILVER EYE).

Polymixia japonica Steindachner, Fische Japans, I, 1883, p. 12, pl. iv, fig. 2, 1883; Tokyo.—Ishikawa, Prel. Cat., 1897, p. 58; Tokyo.

Head $2\frac{5}{6}$ to 3; depth $2\frac{2}{3}$ to $2\frac{3}{4}$; D., V, 33 to 34; A., IV, 15 to 16; P., I, 15 to 16; V., I, 6. Scales 7–60–16. Body long, compressed, with the anterior profile convex and descending from the eye to the snout; posterior profile gradually descending to the caudal fin; posterior profile nearly straight. Scales small and rough. Head compressed and more or less scaly; eye large, 3 in the head and $1\frac{3}{4}$ in the maxillary; snout short, very obtuse, produced, about $1\frac{2}{3}$ in eye and 3 in the maxillary; mouth large, inferior, the maxillary expanded distally until a little more than half the eye and reaching a short distance behind the eye; jaws with broad, rough patches of minute teeth; mandibular barbels reaching the ventrals in smaller specimens; suborbital narrow, about one-third the eye; nostrils close together in front of the eye, the posterior an elongate slit, the anterior rounded and covered by a flap; interorbital space convex, scaled till even with the front margin of the eye, a little less than the eye and 2 in the maxillary; preoperculum and operculum scaly. Gill-opening large, the gill-rakers 5+9, moderate, compressed. Origin of the dorsal nearer the tip of the snout than the base of the caudal; the spinous dorsal with weak spines, graduated to the last, which is the longest and more than half the length of the highest soft rays which includes the first 7 or 8, the rest of the soft dorsal being low and of uniform height; anal spines weak and graduated to the fourth or longest; first anal ray the longest, higher than the fourth anal spine, and similar in shape to the dorsal; pectorals low, short, reaching

beyond the first dorsal rays and about equal to the maxillary; ventrals short, beginning in front of the dorsal and extending for about four-ninths the distance between their own bases and the origin of the anal; caudal deeply forked and the lobes pointed. Lateral line oblique to the caudal peduncle, where it runs straight to the base of the caudal. Caudal peduncle compressed and equal to the eye.

Color in alcohol brown, above and on the back darker and richer; on the sides series of longitudinal stripes of silvery; base of the pectoral black, together with the caudal lobes and the upper portion of the anterior soft dorsal rays; peritoneum black.

Length 8½ inches. Here described from examples from Misaki.

Our numerous specimens were taken at Misaki on long lines by Kumakichi Aoki, the fisherman collector of the marine laboratory of the Imperial University of Tokyo. The species is sufficiently distinct from *Polymixia lowei* of the Atlantic, having smaller scales and larger fins. It is known to fishermen as *Ginme* or Silver Eye.

Family V. MONOCENTRIDÆ.

PINE-CONE FISHES.

The characters of the family are those of the single genus, *Monocentris*. Two species are known, Japanese and Australian. The single genus is notably unlike any other kind of fish whatever, but it seems to be nearest the Berycoids.

8. MONOCENTRIS Schneider.

Monocentris Schneider, Syst. Ichth., 1801, p. 100 (*carinatus*).
Lepisacanthus Lacépède, Hist. Nat. Poiss., III, 1802, p. 321 (*japonicus*).

Body short, deep, compressed, covered with very large bony scales, joined to form a coat of mail. Snout blunt, rounded, protruding beyond the mouth; mouth moderate, villiform; teeth on jaws and palatines, none on vomer; eye moderate; branchiostegals 8; opercular bones entire; suborbitals with radiating ridges. Dorsal spines isolated; soft dorsal moderate; ventrals reduced to a strong spine and 3 soft rays. Caudal not forked. According to Boulenger, the skeleton of *Monocentris* show some affinity to that of the *Berycidæ*, but differs considerably in "the total absence of ribs on any of the vertebræ anterior to the seventh."

(*μόνος*, one; *κέντρον*, spine.)

11. MONOCENTRIS JAPONICUS (Houttuyn).

MATSUKASA UWO (PINE-CONE FISH); MATSUKASAGO (PINE SCULPIN); TAIMUKO-NO-GENPACHI[a] (DICK, THE BRIDEGROOM FISH).

Gasterosteus japonicus Houttuyn, Act. Soc. Harl., XX, 1782, pl. II, p. 329, Nagasaki.
Sciæna japonica (*cataphracta*) Thunberg, Nor. Act. Sci. Suec., XI, 1790, p. 102, pl. III; Nagasaki.

[a] *Genpachi*, a boy's name corresponding to Tom or Dick.

Monocentris cataphracta Bleeker, Kon. Ak. Wet. Amob., 1853, p. 5; Kaminoseki.
Lepisacanthus japonicus Lacépède, Hist. Nat. Poiss., III, 1802, p. 321 (after Houttuyn).
Monocentris japonicus Cuvier and Valenciennes, Hist. Poiss., IV, 1829, p. 461, pl. xcvii; Japan (Coll. Tilesius)—Schlegel, Fauna Japonica, 1847, p. 50, pl. xxii, fig. 1; Nagasaki—Steindachner, Fische Japans, I, 1883, p. 9; Enoshima, Nagasaki, Kanagawa, Philippines.
Monocentris carinata Schneider, Syst. Ichth., 1801, p. 100, pl. xxiv; Japan (called *Monocentris cataphracta* on plate).

Head 2¼ to 2⅓; depth 1⅔ to 1¾; D., V or VI; 11 to 12; A. 10; P. I, 13; V, I 3; scales 2–12 to 14–4. Body deep, compressed, covered with large scales, which are very roughly striated and each with a median keel armed with a series of several backwardly projecting short spines, so as to form 7 rows along the sides; there is a ventral keel similar to the scales along the sides. Head without scales but very rough, the ridges elevated and with papillose skin stretching from one to the other, leaving large mucous cavities underneath; the depth of the head about equal to its length; eye a little in front of the middle, 3½ in the head, greater than the snout, and 1½ in the interorbital space; nostrils directly in front of the eye, the posterior very much the larger; snout very round, obtuse, and projecting beyond the mouth; the mouth large, oblique, and inferior, with the maxillary extending to below the posterior margin of the eye; jaws without teeth; interorbital space roundly convex; gill-opening rather large, with well-developed flap and forming a free fold across the isthmus; gill-rakers somewhat numerous, slender, and at least as long as half of eye; the skin between the jaws below is coarsely papillose or fringed; origin of the dorsal a little behind the gill-opening; spinous dorsal composed of at least 3, very often 4, very robust, strong, pointed spines, inclined alternately somewhat to one side of the body or the other, the first always the shortest, and the second always the longest, the other dorsal spines obsolete; soft dorsal high in the middle with rounded edge; anal high in front and sloping behind; higher than the soft dorsal; pectorals low, 1½ in the head; ventral spine very strong, long, 1⅓ in the head, and reaching the anus caudal with both lobes pointed, the edge emarginate; caudal peduncle a little less than the eye.

Color in alcohol, pale brown; each scale with skin at its base blackish, forming a reticulated pattern as it shows along the edges; jaws, blackish; several blackish bands radiating from the eye and around the opercles. Total length, 5 inches.

Here described from Nagasaki examples.

Color in life, coppery brown above and on the fins; sides and below, coppery yellow; outlines of scales, blackish.

This extraordinary little fish is rather common in clear waters with rocky bottom off the coast of Japan. Our numerous specimens are from Tokyo, Misaki, Wakanoura, Sagami Bay, Suruga Bay, Nagasaki, and Nafa in Okinawa.

Houttuyn observes in regard to this species: "I have never seen the equal of it." It is certainly one of the most aberrant of all known fishes.

SUMMARY.

FAMILY I. BERYCIDÆ.

1. *Beryx* Cuvier.

1. *decadactylus* Cuvier and Valenciennes.
2. *splendens* Lowe; Tokyo, Yokohama.

FAMILY II. TRACHICHTHYIDÆ.

2. *Cephyroberyx* Boulenger.

3. *japonicus* (Döderlein); Suruga Bay.

3. *Hoplostethus* Cuvier and Valenciennes.

4. *mediterraneus* Cuvier and Valenciennes; Sagami Bay, Suruga Bay, Kishyu.

4. *Paratrachichthys* Waite.

5. *prosthemius* Jordan and Fowler; Suruga Bay.

FAMILY III. HOLOCENTRIDÆ.

5. *Ostichthys* Jordan and Evermann.

6. *japonicus* (Cuvier and Valenciennes); Misaki, Giran.

6. *Holocentrus* Scopoli

7. *spinosissimus* Schlegel; Wakanoura.
8. *alburuber* Lacépède; Okinawa.
9. *ittodai* Jordan and Fowler; Okinawa.

FAMILY IV. POLYMIXIIDÆ.

7. *Polymixia* Lowe.

10. *japonica* Steindachner; Misaki.

FAMILY V. MONOCENTRIDÆ.

8. *Monocentris* Schneider.

11. *japonicus* (Houttuyn); Tokyo, Misaki, Wakanoura, Suruga Bay, Nagasaki and Naha.